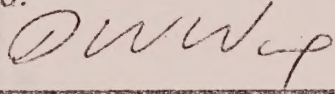


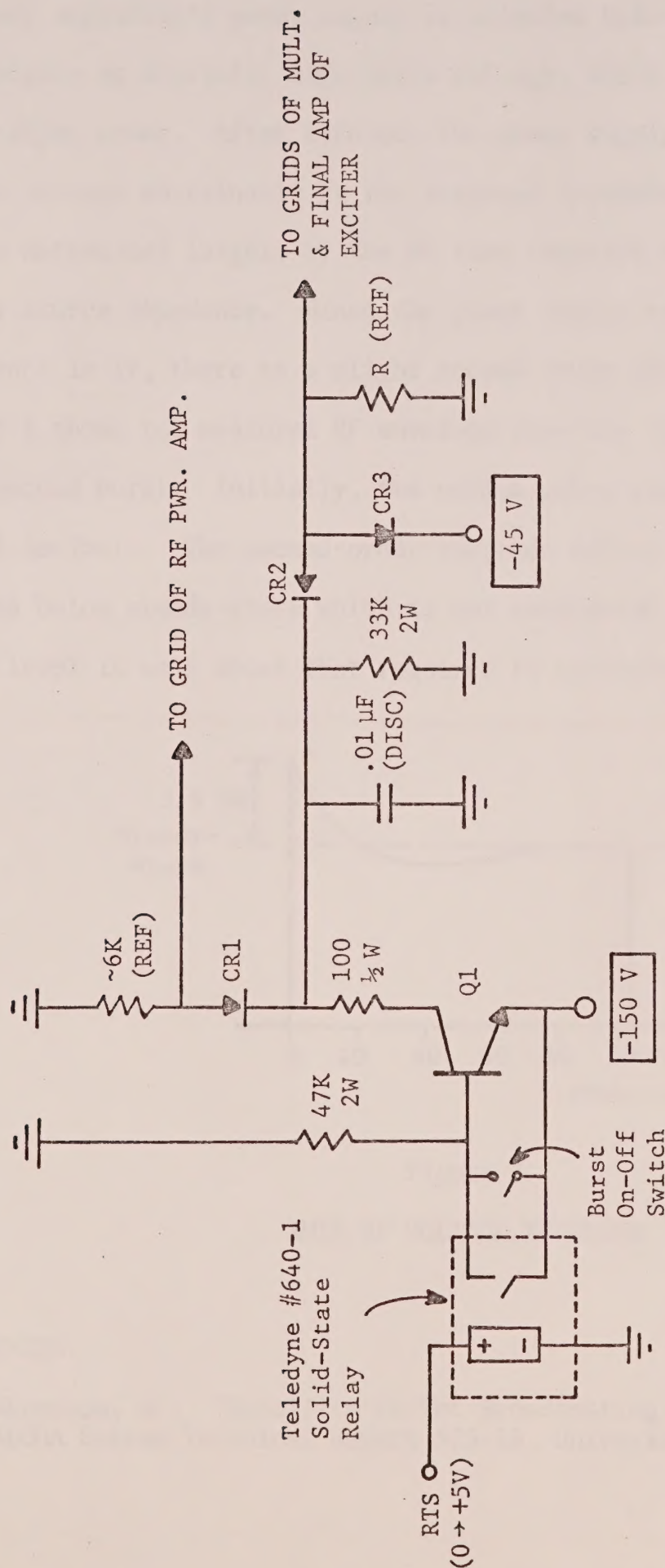
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THE ALOHA SYSTEM		project: ATS-1	document no. CCG/G-77	pages: 3 pages
title: IMPROVED ATS-1 XMTR CONTROL			document type: General Document	
			date: March 4, 1976	
author(s): David Wax		checked: 	approved:	

The purpose of this document is to describe an improved power control circuit for the ATS-1 300-watt VHF transmitter. The circuit was implemented to provide rapid turn-on and turn-off switching of the RF power output from the transmitter. This capability allows reliable transmission of short data bursts at high burst rates, as required for packet-with-voice experiments over the ATS-1 satellite transponder.

The power control switch circuit is shown in Figure 1. The circuit operates on a grid-blocking basis, wherein a -150 volt bias is maintained on the grids of the final power amplifier and the final multiplier and power amplifier of the exciter for the off condition. This off-bias is removed, via transistor Q1, upon command of the Request-To-Send signal (RTS) to enable the transmitter to produce full power. Measurements of the RF power pulse indicate that full power is reached in less than 400 microseconds after turn-on command, and power is turned-off within 200 microseconds after turn-off command.

An interesting side-effect of this control method is that a higher RF power is initially produced by the transmitter, which decays off exponentially to the steady-state power level in about 20 milliseconds. Thus the transmitter automatically produces extra power during the critical synchronization period to ensure better capture and thus more reliable sync capability. There is a more fundamental advantage resulting from this phenomenon, since it will give greater priority (by capture) to shorter bursts in a satellite



Q1: 300 V Rating NPN Transistor
CR1 - CR3: 600 PIV Rectifier Diode

Figure 1

RF POWER SWITCH CONTROL FOR G.E. ATS-1 TRANSMITTER



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broadcast system (see [1]). This phenomenon is caused by the fact that the RF power amplifier's power supply is unloaded before the burst is initiated and outputs an initially high plate voltage, which results in an initially high output power. After turn-on, the power supply capacitors discharge down to the voltage sustainable by the internal impedance of the power supply at a rate determined largely by the RC time constant of the capacitors and power supply source impedance. Since the power supply source impedance has some reactance in it, there is a slight second-order effect, but it is well-damped. Figure 2 shows the measured RF envelope from the transmitter for a 100 millisecond burst. Initially, the output power exceeds the steady-state level by 3.5 decibels. The second-order response effect reduces power to one decible below steady-state which is not considered any problem since the output power level is well above that required to saturate the ATS-1 transponder.

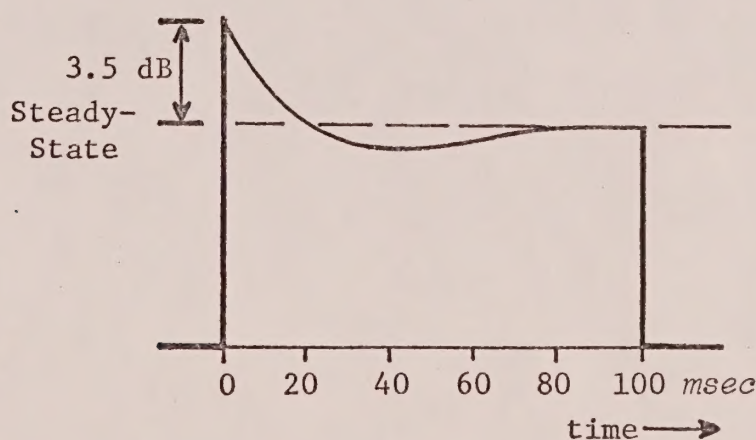


Figure 2

XMTR RF VOLTAGE ENVELOPE

REFERENCES:

- [1] Abramson, N.: "Satellite Packet Broadcasting To Very Small Earth Stations," ALOHA System Technical Report B75-25, University of Hawaii, July 1975.

